

CAIE Biology A-level

Topic 2 - Biological Molecules

Definitions and Concepts

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Alpha glucose - A structural isomer of glucose that exists in a ring form where the hydroxyl group on carbon-1 lies below the plane of the ring.

Amino acids - The monomers containing an amino group (NH_2), a carboxyl group (COOH) and a variable R group that make up proteins.

Amylopectin - A branched polysaccharide made up of alpha glucose monomers joined by α -1,6 glycosidic bonds that makes up starch along with amylose.

Amylose - An unbranched polysaccharide made up of alpha glucose monomers joined by α -1,4 glycosidic bonds that makes up starch along with amylopectin.

Benedict's test - A biochemical test for reducing sugars that produces a different colour based on the amount of reducing sugar present.

Beta glucose - A structural isomer of glucose that exists in a ring form where the hydroxyl group on carbon-1 lies above the plane of the ring.

Biuret test - A biochemical test that produces a purple colour when it is added to a solution containing protein.

Cellulose - A polysaccharide made of beta glucose monomers joined by β -1,4 glycosidic bonds that is used as a structural polysaccharide, providing strength to plant cell walls.

Collagen - A type of fibrous protein that provides strength to many different cell types and makes up connective tissues.

Condensation reaction - A type of reaction that joins two molecules together with the formation of a chemical bond involving the elimination of a molecule of water.

Disaccharide - Molecules formed by the condensation of two monosaccharides.

Disulfide bond - A covalent bond formed between sulfur-containing cysteine side chains of amino acids.

Emulsion test - A biochemical test that produces a cloudy emulsion when performed on lipids.

Fibrous proteins - A class of long chain proteins that are generally insoluble in water and typically have structural roles.

Globular proteins - A class of spherical shaped proteins that are generally water-soluble and typically have metabolic roles.

Glycogen - A highly branched polysaccharide made of alpha glucose monomers that is used as the main storage of energy in humans and animals.

Glycosidic bond - A bond between two monosaccharides formed in a condensation reaction.



Haemoglobin - A type of conjugated globular protein used to transport oxygen that is made up of four polypeptide chains, each containing a haem prosthetic group.

Hydrogen bond - A type of weak bond formed between an electropositive hydrogen and an electronegative atom like oxygen or nitrogen.

Hydrolysis reaction - A type of reaction involving the use of a water molecule that breaks a chemical bond between two molecules.

Hydrophobic interaction - Polar side chains face the cytosol. Non-polar side chains arrange to minimise the surface area in contact with water and often point inwards.

Iodine test - A biochemical test that produces a blue/black colour when it is added to a solution containing starch.

Latent heat of vapourisation - The amount of energy needed for a substance to change state from a liquid to a gas.

Macromolecule - A large molecule formed by condensation reactions between smaller molecules. Polymers are a type of macromolecule, but not all macromolecules are formed from repeating units.

Monomers - The smaller units from which larger molecules are made.

Monosaccharide - The individual sugar monomers from which larger carbohydrates are made.

Non-reducing sugar - A sugar that does not have a free aldehyde or ketone functional group so cannot act as a reducing agent, e.g. sucrose.

Peptide bond - The bond between amino acids formed by a condensation reaction between the -H of the amine group on one molecule and the -OH of the carboxylic acid group on the other molecule.

Phospholipid - A type of lipid formed by the condensation of one molecule of glycerol, two molecules of fatty acid and a phosphate group. The two fatty acid chains are the non-polar hydrophobic tails whilst the phosphate group is the polar hydrophilic head.

Polymers - Molecules made from a large number of monomers joined together.

Polysaccharide - Molecules formed by the condensation of many monosaccharides.

Primary structure - The individual sequence of amino acids in a protein.

Quaternary structure - A structure only applicable to proteins with multiple polypeptide chains that describes the interactions of the different chains.

Reducing sugar - A sugar that has a free aldehyde or ketone functional group so can act as a reducing agent, e.g. maltose, fructose, glucose.



Secondary structure - The local interactions of the amino acids in the polypeptide chain resulting in an alpha helix or a beta-pleated sheet.

Solvent - A substance which other solutes are dissolved in.

Specific heat capacity - The amount of energy needed to raise the temperature of a substance by a specific amount.

Starch - A polysaccharide made of alpha glucose monomers that is used as the main storage of energy in plants.

Sucrose - A disaccharide formed by condensation of a glucose molecule and a fructose molecule.

Tertiary structure - The way that the whole protein folds to make a three-dimensional structure.

Triglyceride - A type of lipid formed by the condensation of one molecule of glycerol and three molecules of fatty acid.

